

I 21677-66

ACC NR: AP6008770

tials in series two—five were recorded before vibration, in the first, sixth, and tenth minutes of vibration, and immediately after vibration. An electrodynamic testing device equipped with a dynamometer created the necessary vibration. During the ten-minute vibration period the subject pressed his palm to the stand with 8 kg of force. While the biocurrents were being recorded, he rested his hand on the vibrating device without pressure and squeezed a polyethylene bulb connected to a manometer with his first and second fingers. It was found that under the influence of vibration of complex spectral composition no one type of change in electrical activity predominated. This was explained by the composition of the vibration spectrum, which included frequencies having opposing effects on the organism. It was demonstrated that when the subject is exposed to vibration on a background of static load, the normal process of increase in the electrical activity of muscles after cessation of static load is destroyed at vibration frequencies of 1000 and 2000 cps. In addition, vibration at 250 cps and above alters the normal reaction of increase in electrical activity at the moment of static load. Sinusoidal vibration, it was concluded, causes a predominance of reactions of decreased electrical activity and phase changes of electrical activity. This may be connected with the development of inhibition in nerve centers and disruption of circulation in upper extremities under the influence of vibration. Vibration of complex spectral composition was found to cause changes in biopotentials different from those occurring when high-frequency components of this spectrum were taken separately. However, these high-frequency components influence the character of electrical activity (phase reactions and reactions of decreased excitability). Orig. art. has: 2 figures. [JS]

SUB CODE: 06/ SUBM DATE: 21Sep64/ ORIG REF: 006/ OTH REF: 001/ ATD PRESS: 4221
Card 2/2

Butkovskiy, A.G.

NOT/50-95-1-48/57

Development of the Theory and the Application of Discrete Automatic Systems (Soviet Union)

1959, No. 1, pp. 156-159 (USSR)

PERSONAL:

ABSTRACT:

The conference dealing with this problem took place in Moscow from September 22 to 26, 1959 and was opened by A. G. Butkovskiy, chairman of the National Academy of Sciences of the USSR for automatic systems (National Academy of Sciences of the USSR for Automatic Systems). At the closing of the conference, A. G. Butkovskiy reported on discrete automatic systems and their development. The results of the conference were held by 5 sessions. Reports were held by 1. G. P. Butkovskiy and V. P. Pavlov reported on new investigation results in the case of pulse systems with variable parameters.

Butkovskiy dealt in his report with his successful procedures of analysis of pulse systems with several elements. F. M. Kishin spoke about the problem of an increase of the perturbation stability of the systems.

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1. A. Z. Tsypkin investigated the possibilities of pulse systems. He constructed an automatic control system with a discrete controlling device.

2. A. Z. Tsypkin analyzed pulse systems. He investigated the conditions of eigen oscillations in a system with wide range pulse modulation. N. V. Butkovskiy reported on the method of determining parameters of a boundary cycle for an extreme system.

3. A. Z. Tsypkin dealt with the results of approximation of calculation methods of extreme systems.

4. A. Z. Tsypkin investigated the influence of perturbations. I. G. Butkovskiy and B. M. Butkovskiy reported on the construction of optimum control systems for objects with feedback.

5. A. Z. Tsypkin investigated the effect of determining the parameters of control systems. G. G. Butkovskiy spoke about the construction of an automatic system for objects with retardation which permits the best possible control systems.

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6. A. Z. Tsypkin analyzed modern telemechanical equipment from the viewpoint of the so-called "finite automatic machines" (consisting of systems of a finite number of elements).

7. A. Z. Tsypkin reported on the effect and construction of a special logical machine for the analysis of relay orders.

8. A. Z. Tsypkin investigated accurate finite automatic machines in the case of an unvariable structure (turning of a relay in a system of a finite number of elements).

9. A. Z. Tsypkin investigated the conditions of eigen oscillations in a system of finite automatic machines with the logical elements described as "nodes" and "edges" by means of which further logical functions can be put into practice.

The participants in the conference considered the technical aspects of the papers presented. The results of the conference are summarized in the report.

10. A. Z. Tsypkin investigated the results of the conference and the results of the conference. He summarized the results of the conference and the results of the conference.

11. A. Z. Tsypkin investigated the results of the conference and the results of the conference. He summarized the results of the conference and the results of the conference.

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BUTKOUSKIY, A.G.

PHASE I BOOK EXPLOITATION

SOV/4403

Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki

Avtomaticheskoye upravleniye; [sbornik rabot] (Automatic Control; Collected Works) [Moscow] Izd-vo AN SSSR [1960] 431 p. Errata slip inserted. 5,500 copies printed.

Ed.: Ya.Z. Tsypkin, Doctor of Technical Sciences, Professor; Ed. of Publishing House: Ye.N. Grigor'yev; Tech. Ed.: G.A. Astaf'yeva.

PURPOSE: This collection of reports is intended for scientists and engineers engaged in the study of automation.

COVERAGE: The collection contains reports presented at the 6th Conference of Young Scientists of the Institut avtomatiki i telemekhaniki AN SSSR (Institute of Automation and Telemechanics of the Academy of Sciences USSR) in January 1959. The collection covers a wide range of scientific and technical problems connected with automatic control. No personalities are mentioned. References accompany each report.

TABLE OF CONTENTS:

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Automatic Control (Cont.)

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PART I. AUTOMATIC CONTROL

Braverman, E.M. Use of the Method of Successive Approximations During the Adjustment of Industrial Controllers Based on Transients in a Closed-Loop System

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The author investigates a method of optimizing the control process of a closed-loop system which is described by a system of differential equations with given adjustment parameters. He solves the problem by applying the root-locus method and by studying the effects of a shifting of the characteristic roots on the transient behavior of the control system. He then applies this method to some specific types of industrial controllers. There are 3 references, all Soviet.

Butkovskiy, A.G. L.S. Pontryagin's Principle of a Maximum in Optimization Systems of Automatic Control With a Linear Actuating Signal

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The author proves the validity of L.S. Pontryagin's principle of a maximum for systems with linear control on the basis of which the optimal control can be determined when it is bound by a closed domain. For the sake of simplicity, the author examines time-optimization systems, but in general the principle of a maximum is valid for other criteria, i.e., the integral of the function of system coordinates and of actuating signals. There are 3 references, all Soviet.

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28-1000

22923

S/123/61/000/007/014/026
A004/A104

AUTHORS: Butkovskiy, A.G., Domanitskiy, S.M.

TITLE: On the synthesis of the control part of optimum systems for some members with lag

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 7, 1961, 3, abstract 7D26 (V sb. "Teoriya i primeneniye diskretn. avtomat. sistem", Moscow, AN SSSR, 1960, 27 - 35)

TEXT: The authors analyze some cases of the synthesis of the control part of control systems of optimum rapid action, the permanent part of which consists of delay components and two integrating components connected in series. The system is given the instruction to finish within the shortest time the misalignment on the output coordinate and of the rate of change of this coordinate during the limiting of the magnitude of the control response. It is pointed out that the shape of the optimum transient response does not depend on the lag. Therefore, in systems of the second order with lag the optimum transient response consists, as in systems without lag of two intervals. During the duration of each of them it is necessary to maintain the control response on one of the boundary values. The

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authors suggest, for the shaping of the control response, to use a model of the permanent part of the system, consisting of two integrating components with the same amplification factor as the object. Since the model does not contain a lag, under certain initial conditions fed to the model its coordinates are going to predict in a certain way during the lag time of the object the deviation of coordinates in the real object. As an example of the realization of the optimum system where a model object is used to determine the sign of the control response the authors analyze a control system of a rolling mill shears developed by the IAT AN SSSR. There are 9 figures and 6 references.

V. Genishta

[Abstracter's note: Complete translation]

Card 2/2

S/103/60/021/06/03/016
B012/B054

AUTHORS: Butkovskiy, A. G., Lerner, A. Ya. (Moscow)
TITLE: Optimum Control of Systems⁹ With Distributed Parameters
PERIODICAL: Avtomatika i telemekhanika, 1960, Vol. 21, No. 6,
pp. 682 - 691

TEXT: Variation problems of a new type are formulated in the first part of the present paper. They are conditioned by the necessity of finding an optimum control in the automation of objects with distributed parameters. The known papers on the theory of optimum control give no general method of solving the problems set. The problem of optimum control of systems with distributed parameters is set up here for certain classes of objects. These are expressed by systems of partial differential equations of the first order and the heat conductivity equation. The characteristic features of the control objects investigated are the following: besides the punctiform control effects, there are also spatially distributed control effects, as well as the limitations associated therewith. It is of importance that these control effects may be contained not only in the

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equations for the process but also in the boundary conditions. The control of objects of the type under consideration may have the purpose of attaining the minimum deviation of the object state from the desired state, or the desired distribution of the object states in compliance with certain conditions. It is pointed out that it is essential to know whether the desired states are attainable. The solution of an optimum control problem is given for an object expressed by partial differential equations of the first order, and the structural scheme of the optimum control systems for such objects is shown. A procedure is mentioned on the basis of which the problem can be solved by means of the maximum principle of L. S. Pontryagin (Ref. 6). It is pointed out that the control system must have an extensive memory for an optimum control of the objects investigated. There are 3 figures and 12 references: 11 Soviet and 1 American.

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B019/B067

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AUTHORS: Butkovskiy, A. G. and Jerner, A. Ya.

TITLE: Optimum Control^q of Systems With Distributed Parameters

PERIODICAL: Doklady Akademii nauk SSSR, 1960. Vol. 134, No. 4,
pp. 778 - 781

TEXT: The authors study the problem of optimum control of objects which are described by a system of partial differential equations with first-order derivatives: $f_i(x, t, Q, \partial Q/\partial x, \partial Q/\partial t, u, v, w) = 0$. Here, x and t are independent variables in the regions $l_0 \leq x \leq l_1$ and $t_0 \leq t \leq t_1$, $Q = Q(x, t) = (Q_1(x, t), \dots, Q_n(x, t))$ is a vector function characterizing the state of the object. $u = u(t) = (u_1(t), u_2(t), \dots, u_k(t))$, $v = v(x, t) = (v_1(x, t), \dots, v_r(x, t))$ and $w = w(x) = (w_1(x), \dots, w_s(x))$ are control vector functions. These control functions are subject to the following restrictions: All or part of the partial derivatives up to the r -th order

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of the variables of the control functions are limited by upper and lower limits. Under these conditions three problems may be distinguished: 1) In what manner must the control functions change that with given initial- and boundary conditions the functional $I = I(x, t, Q, \partial Q/\partial x, \partial Q/\partial t, u, v, w)$ attains its minimum. 2) In what manner must the control functions change that the above mentioned functional attains its minimum if $x \in [l_0, l_1]$, and 3) in what manner must the control functions change that the same functional attains its minimum if $t \in [t_0, t_1]$. The condition that the functions $Q(x, t_1)$ and $Q(l_1, t)$ lie in a certain ε -neighborhood of a given vector function $Q^*(x)$ or $Q^*(t)$ must be fulfilled. The same considerations are made for those cases in which the object is described by a system of partial, differential equations with derivatives of higher order. As an example, the authors mention the problem of optimum control of a continuous-flow furnace in which thin bars are heated. The equation of heating $av\partial x/\partial Q + a\partial Q/\partial t + Q - u = 0$ is set up. Here, $0 \leq x \leq L$, $0 \leq t \leq T$, $Q = Q(x, t)$ is the temperature of the metal at a point x and at a moment t , v is the rate of travel of the bars, and $u = u(t)$ the temperature in the

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furnace. By the above described method the author obtains the functional

$$I = \int_0^T [Q_z - Q(L, t)]^2 dt \quad (16),$$
 where Q_z is a constant. This kind of problem

was initially described under point 2). Here, it is solved by
L. S. Pontryagin's maximum principle. It holds that $u_1 \leq u(t) \leq u_2$. The
author obtains $u(t) = u_2$ for $\psi_1 > 0$, $u(t) = u_1$ for $\psi_1 < 0$, and

$$\psi_1(t) = e^{-\lambda t} \left[\psi_1(0) - \int_0^t \lambda Q_z (L - \int_0^s \lambda Q_z ds - \Delta(s)) ds \right]$$

where $\Delta(t) = \Delta(0) + u(t) - u_1$ at $\Delta(0) = Q_z$. ψ_1 is obtained from

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16.9500(1031, 1132, 1121)

AUTHOR: Butkovskiy, A. G. (Moscow)

TITLE: Optimum Processes in Systems With Divided Parameters

PERIODICAL: Avtomatika i telemekhanika, 1961, Vol. 22, No. 1, pp. 17-26

TEXT: In the problem of the optimum control of systems with divided parameters results may be used for the solution, which were obtained in the following problem: the n coordinates of a vector Q , namely $Q_1(t), Q_2(t), \dots, Q_n(t)$, are subjected to the function $Q_i = Q_i(t)$

$$= \int_{t_0}^{t_1} K_i(t, \tau, u_1(\tau), \dots, u_r(\tau)) d\tau \quad (1), \text{ where } K_i(t, \tau, u_1, \dots, u_r),$$

($i = 1, 2, \dots, n$) is a given function. The control functions $u_k = u_k(t)$ ($k = 1, 2, \dots, r$) are assumed to be stepwise continuous.

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Further the control vector $u = u(u_1(t), \dots, u_n(t))$ is assumed to be in a closed region Ω . That $u = u(t) \in \Omega$ is required at $t_0 \leq t \leq t_1$, in the case of which $Q(t_1) = Q_*$ (its given vector) and a given functional Q_0

$= \int_{t_0}^{t_1} F(\tau, Q(\tau), u(\tau)) d\tau$ (2) has the lowest possible value. The necessary

condition for an optimality, which the control $u(t)$ must satisfy, may be formulated in form of two maximum theorems. Theorem 1: If $u = u(t) \in \Omega$ ($t_0 \leq t \leq t_1$) is that control, it holds $Q(t_1) = Q_*$. For the optimality of $u(t)$ and the corresponding trajectories $Q = Q(\tau)$ it is necessary that a constant non-vanishing vector $c = (c_0, c_1, \dots, c_n)$ exists, that $c_0 \leq 0$ and that for all t , which are in $t_0 \leq t \leq t_1$, the

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function:

$$H = c_0 \int_{t_0}^{t_1} \sum_{i=1}^n \frac{\partial F(\tau, Q(\tau), u(\tau))}{\partial Q_i} K_i(\tau, t, u) d\tau + \\ + c_0 H(t, Q(t), u) + \sum_{i=1}^n c_i K_i(t_1, t, u) \quad (3)$$

of the variable u , $u \in \Omega$, attains a maximum at point $u = u(t)$. Theorem 2: That $u = u(t) \in \Omega$ ($t_0 \leq t \leq t_1$), where $Q(t_1) \in M$ (M is a certain manifold).

The vector $c = (c_0, \dots, c_n)$ must then satisfy theorem 1 and besides also the condition of orthogonality at point $Q(t_1)$. The author proves these

theorems in the appendix to this paper and studies their applicability. First, a heat exchange problem is dealt with, in which the minimum time is sought, within which a body is given a desired temperature distribution by an external temperature field. Further, the optimum control of the heat exchange process between a medium at rest and a moving medium

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such as occurs in industrial continuous heating furnaces, is studied. Proceeding from the thermal conductivity equations for these problems and from the corresponding boundary- and initial conditions, the author follows the above method and obtains integral equation for $u = u(t)$, whose solution determines an extremum. There are 7 Soviet references.

SUBMITTED: May 23, 1960

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E140/E113

AUTHORS: Butkovskiy, A.G., and Sung Chien (Moscow)
TITLE: On the construction of multi-variable function generators

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1961, No.2, pp 120-127

TEXT: The authors first give a rigorous demonstration of the validity of the method first proposed by E.W. Pike and T.R. Silverberg (Ref 1 "Designing mechanical computer", Mech. Design, 1952, V.24, No.7, No.8). They then proceed to derive a system of nonlinear integral equations whose solution gives the required expansion and is a solution to the problem of the best approximation for the given multi-variable function generator. If it is required to find the best mean square approximation to a function of two variables, the usual double Fourier series is inadequate because only the coefficient of the series can be found, not the functions in the series, so that the problem has to be rephrased. The functions in the series are specialised to be bi-orthogonal and independent and, by using a variational method, a system of integral equations is obtained which can be shown to be

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always capable of solution. The solutions are eigenfunctions of a particular type of integral equation and the coefficients of the approximating series are the squares of the eigenvalues. This approach can be extended to the case when instead of just x and y , there are r variables x and s variables y . Treating the x variables as a single variable P_x and the y variables as a single variable P_y , an approximation for the function of P_x and P_y by the above method can be determined, and the process repeated as often as necessary by splitting the P_x and the P_y in turn into smaller groups. Although at each stage the best approximation is obtained the final result is not in general the best and another approach is described in which the terms of the multinomial expansion are obtained successively, which involves the solution of a set of non-linear integral equations. There are 4 references: 3 Soviet and 1 English. The English language reference is as quoted above.

SUBMITTED: October 28, 1960

Card 2/2

BUTKOVSKIY, A.G. (Moskva)

Optimum processes in systems with distributed parameters. Avt.
i telem. 22 no.1:17-26 Ja '61. (MIRA 14:3)
(Automatic control)

16.8000(1103,1031,1013)

2244
S/103/61/022/010/003/018
D274/D301

AUTHOR: Butkovskiy, A. G. (Moscow)

TITLE: Principle of maximum for optimal systems with distributed parameters

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 10, 1961, 1288-1301

TEXT: Optimum control of a system is considered which is described by nonlinear integral equations. A theorem is stated in the form of a principle of maximum which permits determining the extremal values of a sufficiently general variational problem which involves the minimization of an arbitrary functional under additional limitations. Let the controlled process (plant) be characterized by the matrix

$$Q = Q(P) = \begin{pmatrix} Q^1(P) \\ \vdots \\ Q^n(P) \end{pmatrix} \quad (5)$$

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where P is a point of the m -dimensional region D of Euclidean space $E(y_1, \dots, y_m)$. The matrix function Q is called the state of the system. Systems with distributed parameters may have several controllers (which are also distributed). Hence, the controller is described by the vector-function $u = u(S)$ where $S \in D$. Each component of u is expressed by

$$u_{\alpha\beta} = u_{\alpha\beta}(y_1, \dots, y_\alpha) = u_{\alpha\beta}(S_\alpha) \quad (\alpha = 1, 2, \dots, m; \beta = 1, 2, \dots, \rho_\alpha) \quad (7)$$

where ρ_α is a positive integer depending on α . Thus, u has

$$r = \sum_{\alpha=1}^m \rho_\alpha \quad (8)$$

components. The control process consists in fitting to every u its corresponding Q . This is done by means of the operator A :

$$Q = Au \quad (9)$$

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Many systems can be described by nonlinear integral equations of type

$$Q(P) = \int_D K(P, S, Q(S), u(S)) dS \quad (10)$$

where

$$K(P, S, Q, u) = \begin{pmatrix} K^1(P, S, Q, u) \\ \vdots \\ K^n(P, S, Q, u) \end{pmatrix} \quad (11)$$

Hence, the optimum-control problem for a system with distributed parameters can be formulated as follows. Let, on the set Q and u , related by Eq. (10), be determined q functionals which have a continuous gradient

$$I^i = I^i(Q(P)) \quad (i = 0, 1, 2, \dots, l) \quad (14)$$

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and

$$I^i = I^i (Q(P), u(P)) = \Phi^i(z) \quad (i=l+1, \dots, q) \quad (15)$$

where z is the matrix with elements $\int_D F(S, Q, u) dS$, (F being a matrix function). It is required to find, among the allowable controllers, such a controller $u=u(P)$ for which

$$I^i = 0 \quad (i = 0, 1, \dots, p-1, p+1, \dots, q) \quad (18)$$

and the functional I assumes minimum value. Such a controller $u=u(P)$ is called optimal. This problem is solved on the basis of the following theorem. Let u be such an allowable controller that, by Eq. (10), condition (18) holds and the matrix function $M(P, R)$ satisfies the integral equation

$$M(P, R) + \frac{\partial K(P, R, Q(R), u(R))}{\partial Q} = \int_D M(P, S) \frac{\partial K(S, R, Q(R), u(R))}{\partial Q} dS$$

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$$= \int_D \frac{\partial K(P, S, q(S), u(S))}{\partial q} M(S, R) dS \quad (22)$$

Then, in order that u be an optimum controller, it is necessary that such nonzero line-matrices can be found (where $c_p = -1$), so that for nearly all fixed values of $S \in D$, the function $\Pi(S, u)$ be a maximum, i.e.

$$\Pi(S, u) \approx H(S) \quad (25)$$

where

$$H(S) = \sup_{u \in \Omega} \Pi(S, u) \quad (26)$$

This theorem permits setting up a system of equations which are satisfied by the optimum controller. The obtained result is more general than the results obtained by the author (Ref. 4: Avtomatika i telemekhanika, v. 22, no. 1, 1961). As an example of optimum control for a system with distributed parameters, the problem of heating a "thick" body is considered.

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The result obtained agrees with the corresponding result of Ref. 4 (Op. cit.), but it has the advantage of being simpler and faster obtained. Finally, the above results are applied to solving the well-known minimax problem. Let the controlled parameter $x=x(t)$ be related to u by the integral equation

$$x(t) = \varphi(t) + \int_0^t K(t, \tau) u(\tau) d\tau \quad (70)$$

and let

$$|u(t)| \leq 1 \text{ for } 0 \leq t \leq T \quad (72)$$

It is required to find such a controller $u(t)$ that the functional

$$I^0 = I^0(x, t) = \max_{0 \leq t \leq T} |x(t)| \quad (73)$$

be a minimum, whereby $x(T) = 0$; the last condition is equivalent to

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$$I^1 = I^1(x(t)) = \int_0^T \delta(T - \tau) x(\tau) d\tau = 0 \quad (75)$$

After introducing the function $\Pi(\tau, u)$ (see Eq. (25)), one obtains

$$u = u(\tau) = -\text{sign } c_1 K(T, \tau) \text{ for } T \geq \tau > t_m \quad (80)$$

where t_m is the moment when $|x(t)|$ attains its maximum value. It is noticed that t_m can be found by the method of successive approximations. There are 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc (which is a translation).

SUBMITTED: May 18, 1961

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16-8000 (1132)

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S/105/61/022/012/003/016
D201/D305

AUTHOR: Butkovskiy, A. G. (Moscow)

TITLE: Some approximate methods of solving problems of optimum control of distributed parameter systems

PERIODICAL: Avtomatika i telemekhanika, v. 22, no. 12, 1961, 1565-1575

TEXT: The author considers the problem of optimum control of a heat transfer system described by

$$\frac{\partial Q}{\partial t} = a \frac{\partial^2 Q}{\partial x^2} \quad a = \left(\frac{\lambda}{c\rho} \right) \quad (1)$$

in which a = the constant coefficient of temperature conductivity;
 λ = thermal conductivity coefficient; c = heat capacity factor; ρ = specific gravity. The state of the system is described by $Q = Q(x, t)$
where x = space coordinate ($0 \leq x \leq 1$) and t = time coordinate
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$(t_0 \leq t \leq t_1)$. The boundary conditions are

$$Q(x, 0) = Q_0(x) \quad (3)$$

$$\left. \frac{\partial Q}{\partial x} \right|_{x=0} = \alpha [u(t) - Q(0, t)] \quad (4)$$

$$\left. \frac{\partial Q}{\partial x} \right|_{x=1} = 0 \quad (5)$$

where $Q_0(x)$ = a known function, α the constant coefficient of heat exchange. The problem of optimum control is formulated for this case as follows: 1) Let another function $Q^* = Q^*(x)$ be given, determined along $[0, 1]$. The functional

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$$I = I[Q(x, t_1), Q^*(x)] \quad (6)$$

must be minimized. 2) Let function $Q^* = Q^*(x)$ be given. It is required to find such a controlling function that

$$Q(x, t_1) = Q^*(x) \quad \text{at} \quad 0 \leq x \leq 1 \quad (8)$$

and that the transient duration $T = t_1$ - to be minimum. 3) Let the given function be $Q^* = Q^*(x)$. It is required to find such a controlling function

$$u = u(t) \in \Omega \quad (t_0 \leq t \leq t_1)$$

that with the end of the process

$$I_1[Q(x, t_1), Q^*(x)] = \varepsilon$$

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S/103/61/022/012/003/016
D201/D305

Such a problem represents e.g. determination of optimum metal heating, in which the problem of optimum control corresponds actually to that of a system with distributed parameters. The problem may be solved either by reducing the partial differential equations to difference-differential equations and applying the principle of maximum or by relating the controlled object state to the controlling functions by integrals of mathematical physics. It is stated in conclusion that the analysis carried out in the paper is also true in the case of several controlling functions, when such a function depends not only on time but also on space coordinates and with non-zero initial conditions. In this case the problem reduces to that of moments in multi-dimensional space and to representation of kernels of many variables in the form of a sum of products of functions, each depending on one variable only. There are 1 figure and 13 references: 12 Soviet-bloc and 1 non-Soviet-bloc. 4

SUBMITTED: May 26, 1961

Card 4/4

16 700

S/044/62/000/012/044/049
A060/A000

AUTHOR: Butkovskiy, A.G.

TITLE: On the simulation of certain objects with distributed parameters

PERIODICAL: Referativnyy zhurnal, Matematika, no. 12, 1962, 49, abstract 12V285
(In collection "Avtomat. regulirovaniye i upr.", Moscow, AN SSSR, 1962, 242 - 247)

TEXT: The study of problems of optimal control of objects with distributed parameters leads to the requirement for constructing models (simulators) of such objects. Using the example of the process of metal heating in a continuous furnace, a method is considered for the simulation of two types of processes which are describable by two types of partial differential equations

$$b \nu \frac{\partial Q}{\partial y} + b \frac{\partial Q}{\partial t} + Q = u ,$$

$$\frac{\partial Q}{\partial t} = a \frac{\partial^2 Q}{\partial x^2} - \nu \frac{\partial Q}{\partial y} .$$

[Abstracter's note: Complete translation]

L.L. Podkaminer

Card 1/1

BUTKOVSKIY, A. G.

"Optimum Control of Systems with Distributed Parameters. "

Paper to be presented at the IFAC Congress held in
Basel, Switzerland, 27 Aug to 4 Sep 63

S/271/63/000/001/007/047
D413/D308

AUTHOR: Butkovskiy, A.G.

TITLE: On the simulation of certain plants with distributed parameters

PERIODICAL: Referativnyy zhurnal, Avtomatika, telemekhanika i vychislitel'naya tekhnika, no. 1, 1963, 31, abstract 14172 (In collection: Avtomat. regulirovaniye i upr., M., AN SSSR, 1962)

TEXT: The author considers the simulation of plants with distributed parameters. He gives as a concrete example the construction of a model of the process of heating metal in straight-through furnaces, in particular in a process oven which is a typical plant with space-distributed parameters.
[Abstracter's note: Complete translation]

Card 1/1

BUTKOVSKIY, A.G. (Moskva)

Expansion of the maximum principle for optimum control problems.
Avtom.i telem. 24 no.3:314-327 Mr '63. (MIRA 16:4)
(Automatic control)

L 14411-63 EWT(d)/BDS AFFTC/ARGC/ASD ~~Fg-4/Pk-4/Pg-4/Rq-4~~ LJP(C)/BC

ACCESSION NR: AP3004816

S/0103/63/024/008/1056/1064

AUTHOR: Butkovskiy, A. G. (Moscow) 69

TITLE: On necessary and sufficient optimality conditions for sampled-data control systems

SOURCE: Avtomatika i telemekhanika, v. 24, no. 8, 1963, 1056-1064

TOPIC TAGS: sampled-data control system, necessary optimality condition, sufficient optimality condition, local-maximum principle, extended-maximum principle

ABSTRACT: The optimal control of sampled-data systems described by the system of difference equations written in matrix form as

$$x(k+1) = f[x(k), u(k)] \quad (k = 0, 1, \dots, N-1), \quad (1)$$

where $x(k)$ is a matrix characterizing the state of a system and $u(k)$ is the matrix defining the control action at every discrete instant $k = 0, 1, \dots, N-1$ is studied. It is assumed that $f(x, u)$ are continuous functions with respect to components of the matrix u and have continuous first partial derivatives

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ACCESSION NR: AP3004816

with respect to components of the matrix x . The problem of optimal control is formulated for system (1). The author raises the question of the existence of the complete analog of the maximum principle for such control systems. An example of an optimal sampled-data control system is presented in which the analog of the maximum principle is not fulfilled. The author presents a new proof of necessary optimality conditions, which are formulated as a local-maximum principle. The function H which is introduced is not a complete analog of the function H appearing in the theorem on the maximum principle in control systems described by ordinary differential equations. Sufficient conditions for the allowable control $u(k)$ and the trajectory $x(k)$ to be optimal are formulated as an extended-maximum principle. By combining theorems on local- and extended-maximum principles, necessary and sufficient conditions are derived for the case when (1) is a linear system of the form

$$x(k+1) = Ax(k) + Bu(k) \quad (k = 0, 1, \dots, N-1), \quad (2)$$

where A and B are matrices which can be dependent on k . Orig. art. has: 51 formulas and 2 figures.

Card 2/20

BUTKOVSKIY, A.G. (Moskva)

Method of moments in the theory of optimum control of systems with distributed parameters. Avtom. i telem. 24 no.9:1217-1225 S '63.

(Automatic control)

(MIRA 16:9)

BUTKOVSKIY, A.G.; LERNER, A.Ya.; MALYY, S.A.

Problems of optimum control of processes involving the
extraction of products from a melt. Dokl. AN SSSR 153 no.4:
772-775 D '63. (MIRA 17:1)

1. Institut avtomatiki i telemekhaniki AN SSSR. Predstavleno
akademikom V.A. Trapeznikovym.

ANDREYEV, Yu.N. (Moskva); BUTKOVSKIY, A.G. (Moskva)

Optimum control of the heating of solid bodies. Izv. AN
SSSR. Tekh. kib. no.5:45-54 S-O '64. (MIRA 17:12)

ANDREYEV, Yu.N.; BUTKOVSKIY, A.G.

Problem involving optimum control of heating massive bodies.
Inzh.-fiz. zhur. 8 no.1:87-92 Ja '65. (MIRA 18:3)

1. Institut avtomatiki i telemekhaniki, Moskva.

L 5099-66

ACC NR: AP5027883

EWT(d)/EWT(m)/EWP(w)/EPF(n)-2/EWP(1)/ETC(m) IJP(c) WW/EM/BC
SOURCE CODE: UR/0103/65/026/011/1900/1914

AUTHOR: Butkovskiy, A. G. (Moscow); Poltavskiy, L. N. (Moscow)

ORG: none

TITLE: Optimum control of a uniformly distributed vibratory system

SOURCE: Avtomatika i telemekhanika, v. 26, no. 11, 1965, 1900-1914

TOPIC TAGS: optimum control, vibratory system control, string vibration, moment theory

ABSTRACT: The problem of optimal control of uniformly distributed vibratory systems is analyzed by means of a vibrating string whose motion is described by the wave equation in which the displacement function $Q(x, t)$ satisfies the following boundary and initial conditions:

$$\begin{aligned} Q(0, t) &= u(t), & Q(\pi, t) &= 0, \\ Q(x, 0) &= Q_0(x), & Q'(x, 0) &= Q_1(x) \end{aligned} \quad (1)$$

where $Q_1(x)$ and $Q_0(x)$ are the initial velocity and initial displacement of the string, respectively. The following optimum control problem is formulated: to find a control $u(t)$ whose norm, defined by the equation

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UDC: 531.391

L 5099-66

ACC NR: AP5027883

$$\|u\|_q = \sqrt[q]{\int_0^T |u(t)|^q dt},$$

(2)

is to be less than or equal to a given number L ($\|u\|_q \leq L$), which will damp the vibration of a string in minimum time T , that is, to obtain $Q(x, T) = 0$ and $Q_t'(x, T) = 0$ in a minimum time. It is shown how this optimum control problem can be reduced to the "L-problem" of the theory of moments. Using M. G. Kreyn's results on the "L-problem" and the variational method, basic formulas for the optimum control $u(t)$ of the uniformly distributed vibratory system are derived and the minimum time T is determined. Some results of the theory of moments are generalized. Orig. art. has: 1 figure and 38 formulas. [LK]

SUB CODE: E, MA/

SUBM DATE: 29 Jan 65/ ORIG REF: 004/ OTH REF: 000/

ATD PRESS: 4134

Cord 2/2

ACC NR: AP6023660

SOURCE CODE: UR/0103/66/000/004/0032/0041

AUTHOR: Butkovskiy, A. G. (Moscow); Poltavskiy, L. N. (Moscow)

ORG: none

TITLE: Optimal control of a two-dimensional distributed oscillating system

SOURCE: Avtomatika i telemekhanika, no. 4, 1966, 32-41

TOPIC TAGS: optimal control, oscillating system, set theory, function theory, orthogonal function

ABSTRACT: An analysis is made of two problems involving the optimal control of a two-dimensional oscillating system with the control norm $u(t)$ in space L_q ($q = 2, 3, \dots, \infty$) limited by the number $L > 0$. Through the use of the L -problem of the moments (A. G. Butkovskiy, Metod momentov v teorii optimal'nogo upravleniya sistemami s raspredeennymi parametrami, Avtomatika i telemekhanika, t. XXIV, No. 9, 1963), explicit formulas are obtained for the optimal control of a two-dimensional oscillating system with "part" of the oscillations quenched. Qualitative characteristics of the controlled process are given, and it is shown that the expressions derived by the authors in a previous work (Optimal'noye upravleniye raspredelel'noy kolebatel'noy sistemy, Avtomatika i telemekhanika, t. XXVI, No. 11, 1965) for optimal

Cord 1/2

UDC: 62-505

ACC NR: AP6023660

control with control restraints for the space norm $L_q(1 < q < \infty)$ also preserve their form when $q = \infty$. Orig. art. has: 32 formulas.

SUB CODE: 09, ¹³14/ SUBM DATE: 09Aug65/ ORIG REF: 005

Card 2/2 JS

L 01258-67 EWT(d)/EWP(k)/EWP(h)/EWP(1)/EWP(v) BC

ACC NR: AP6032426

SOURCE CODE: UR/0103/66/000/009/0048/0053

AUTHOR: Butkovskiy, A. G. (Moscow); Poltavskiy, L. N. (Moscow)

ORG: none

TITLE: Optimal control of oscillatory processes

SOURCE: Avtomatika i telemekhanika, no. 9, 1966, 48-53.

TOPIC TAGS: optimal control, oscillatory process control, oscillation quenching, wave equation, telegraph equation

ABSTRACT: The optimal control problem of oscillatory processes described by the one-dimensional wave equation

$$\frac{\partial^2 Q(x, t)}{\partial t^2} = a^2 \frac{\partial^2 Q(x, t)}{\partial x^2} \quad (1)$$

is analyzed in the domain $D = \{0 \leq x \leq \pi, 0 \leq t \leq T\}$ under the following conditions

$$Q(0, t) = u(t), \quad Q(\pi, t) = 0, \quad (2)$$

$$Q(x, 0) = Q_0(x), \quad \left. \frac{\partial Q(x, t)}{\partial t} \right|_{t=0} = Q_1(x). \quad (3)$$

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ACC NR: AP6032426

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The optimal control problem is formulated as follows: to find a control $u(t)$ (the wave) which will quench the oscillations within a fixed time T at the minimal value of the norm $\|u(t)\|_q$, that is, by selecting the proper $u(t)$ which will ensure that at a minimal value of $\|u(t)\|_q$, the conditions

$$Q(x, T) = 0, \quad Q'(x, T) = 0 \quad (4)$$

will be satisfied. The following concepts of quenching and self-quenching functions $u(t)$ (waves) are introduced. The function $u(t)$ defined on the interval $(0, T)$ for equation (1) with conditions (2) and (3) is called a quenching function in time T if conditions (4) are satisfied. The function $u(t)$ defined on the interval $(0, T)$ for equation (1) with condition (2) and initial conditions is called a self-quenching function in time T if conditions (4) are satisfied. It is pointed out that both functions are solutions of the so-called L-problem of moments. Examples of the quenching and self-quenching functions in time $2\pi a$ are presented. The solution of the optimal control problem is sought in the form

$$u_0(t) = u^r(t) + K_0 u^c(t), \quad (5)$$

where $u^r(t)$ is a quenching function selected in a certain manner, $u^c(t)$ is a self-quenching function also selected in a certain manner, and K_0 is a constant determined from a certain condition. Conditions for the existence of quenching functions are

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presented and it is established that both functions which determine the optimal control (5) have the period $2\pi/a$. Expressions for quenching and self-quenching functions are derived and the optimal control function is determined. The optimal control process described by the telegraph equations is analyzed as a particular case. The optimal control function $u(t)$ is derived under the assumption that the norm $\|u\|_q$ is bounded. Orig. art. has: 26 formulas. [LK]

SUB CODE: 20 SUBM DATE: 31Jan66/ ORIG REF: 005/ ATD PRESS: 5097

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Card 3/3

ACC NR: AM6030071

Monograph

UR/

Butkovskiy, Anatoliy Grigor'yevich

Optimum control theory of distributed parameter systems (Teoriya optimal'nogo upravleniya sistemami s raspredelennymi parametrami) Moscow, Izd-vo "Nauka", 1965. 474 p. illus., biblio. 8000 copies printed.

Series note: Teoreticheskiye osnovy tekhnicheskoy kibernetiki

TOPIC TAGS: engineering cybernetics, automatic control theory, optimal automatic control, distributed parameter system

PURPOSE AND COVERAGE: This book presents the most recent developments in the theory of design of automatic control for systems having spatially distributed parameters. The development of reliable, accurate, and sufficiently simple models of controlled systems (plants) with distributed parameters in order to achieve optimal control is discussed. A whole series of necessary and sufficient conditions for optimal processes is developed on the basis of functional analysis, for example, the generalized Pontryagin maximum principle and Bellman's dynamic programming method. Approximate methods are given for solving the derived equations which are adapted to solution by digital and analog computers. The theory presented here is applied to optimalization of thermal and chemical processes. This book should be useful to specialists concerned with the results of optimal control theory and their application to various fields of technology.

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ACC NR: AM6030071

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Card 2/2

SUB CODE: 13/

SUEM DATE: 12Nov65/

ORIG REF: 116/ OTH REF: 001

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Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. i sudostroit.
lit-ry, 1953. 296 p. (MLRA 7:7)
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BUTKOVSKIY, G., inzh.; NAYDIN, Yu., inzh.

Machine tools and production lines made of standard units. WFO
2 no.10:20-25 0 '60. (MIRA 13:10)

1. Spetsial'noye konstruktorskoye byuro No.1 Moskovskogo gorodskogo
sovnarkhoza.

(Machine tools—Technological innovations)
(Machinery, Automatic)

BUTKOVSKIY, K.A., inzh.

Development of the industry of synthetic cleaning compounds (from
"Seifen-Öle-Fette-Wachse," Nos. 4 and 5, 1958). Masl.-zhir. prom. 24
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(Cleaning compounds)

BUTKOVSKIY, K.A., inzh.

Latest development in the manufacture of fast-action de-
tergents (from "Seifen-Ole-Fette-Wachse," no.17, 1958).
Masl.-zhir.prom. 25 no.11:46 '59. (MIRA 13:3)
(Cleaning compounds)

BUTKOVSKIY, K. A.

STATE 1 BOOK IDENTIFICATION BOX/14659

Оценку технологичности переработки синтетических смол (Fundamentals of Synthesis Technology in Petroleum Chemistry) Moscow, Gosneftkhimizdat, 1960. 852 p., 3,800 copies printed.

Eds.: Platonev, Arkady I. I., Professor, and Iev Alexandrovich Pokolovskiy, Professor, Executive Ed.: L.A. L'vov; Tech. Ed.: E.A. Mukhsam.

PETROCHEM. This book is intended for engineers and chemists of petroleum refineries and chemical plants, for committees of the national economy, planning organizations and scientific research institutes engaged in chemical processing and large-scale utilization of petroleum stock for the production of synthetic products.

COVERAGES: The book describes important commercial methods of producing hydrocarbon petroleum and gas stock and coal stock for the manufacture of alcohols, aldehydes, ketones, acids, detergents, synthetic fibers, and synthetic rubber. Flow sheets are included, and the basic equipment of the petrochemical industry is described. The petrochemical properties of the various hydrocarbons are discussed and the physical properties of the petrochemical industry are given. The ISBN and prospects for its development are covered. No personalities are mentioned.

REVIEWERS: Follow each chapter.

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BUTKOVSKIY, K.A., inzh.

Toilet soap based on surface active agents (from "Seifen-Ole-
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Ag '60. (MIRA 13:8)
(Soap) (Surface active agents)

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(MIRA 18:8)

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G.S., red.izd-va; ~~SABITOV, A., tekhn.red.~~; BERESLAVSKAYA, L.Sh.,
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[Financial aspects of mining enterprise operations] Osnovnye
voprosy finansovoi deiatel'nosti gornogo predpriatiia. Moskva,
Ugletekhizdat, 1959. 146 p. (MIRA 12:12)
(Mining industry and finance)

SOV/124-57-7-8468

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 7, p 150 (USSR)

AUTHORS: Gontkevich, V. S., Butkovskiy, V. V.

TITLE: The Determination of Internal-friction Energy Losses in Metals Due to Bending Vibrations (Opredeleniye poter' energii na vnutrenneye treniye v metalle pri izgibnykh kolebaniyakh)

PERIODICAL: Sb. tr. Labor. problem bystrokhod. mashin i mekhanizmov
AN UkrSSR, 1955, Nr 5, pp 167-178

ABSTRACT: The authors adduce some results of an experimental investigation on the dissipation of energy in various steels of some ten grades during damped bending vibrations, for which purpose the well-known tuning-fork-shaped test specimens were used and the amplitude of vibration was recorded on a motion-picture film by means of an MPO-2 loop oscillograph and strain gages glued onto the handle of the tuning fork. The account of the test results is preceded by a certain amount of theoretical analysis of the transverse vibrations of the handle of a tuning fork, taking into consideration the dissipation of energy within the material. Here the authors base their reasoning on the expression of the stresses at a given moment of time in a specific fiber at a

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SOV/124-57-7-8468

The Determination of Internal-friction Energy Losses in Metals (cont.)

distance η from the neutral axis offered by A. P. Filippov (RZhMekh, 1954, abstract 3071)

$$\sigma = E \left[\epsilon + \frac{1}{\omega} (\mu_0 + \mu_1 |\epsilon_0| + \mu_2 \epsilon_0^2) \frac{\partial \epsilon}{\partial t} \right]$$

where μ_0 , μ_1 , and μ_2 are the damping coefficients, ω is the vibration frequency, and ϵ_0 is the amplitude of the relative deformation. The coefficients μ_0 , μ_1 , and μ_2 are determined from the following equation derived by the authors;

$$\frac{\delta(A_1)}{\pi} = \mu_0 + \mu_1 \frac{C m_1^2}{l^2} A_1 + 35.49 \mu_2 \frac{D m_1^4}{l^4} A_1^2$$

where $\delta(A_1)$ is the logarithmic decrement of the vibrations of the tuning fork, which is determined from experimental data covering 5-to-10-percent sectors of amplitude decay. Herein

$$C = \frac{3}{8} h, \quad D = \frac{3}{20} h, \quad A_1 X_1(l) = 0.9744 y$$

h is the thickness of the handle, l is its length, m_1 is a characteristic parameter. $X_1(l)$ is the eigenfunction, and y is the static deflection of the end of the handle.
Card 2/3

The Determination of Internal-friction Energy Losses in Metals Due to (cont.) SOV/124-57-7-8468

The experimental values of the logarithmic damping decrements obtained with the use of the above-mentioned method of study of the energy dissipation with a highly-nonuniform state of stress are expressed in graphic form as a function of the maximum stresses at the base of the handle. The damping coefficients obtained, μ_0 , μ_1 , and μ_2 , are presented in tabular form. The article corroborates such previously-established facts as the increase of the logarithmic decrement with an increase in amplitude and the absence of a relationship between the logarithmic decrement and the frequency (within the limits of 100 to 625 cps). It is pointed out that the damping coefficients thus derived may be used for the calculation of the transverse vibrations of rods of any shape and with any type of stress distribution. Bibliography: 10 references.

G. S. Pisarenko

Card 3/3

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Multipoint measuring bridge for wire data recorders. Sber. trnd.
lab. probl. bystr. mash. no.5:187-194 '55. (MLRA 9:2)
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(Lithuania—Cattle)

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SO: Sum 432, 29 Mar 55

COUNTRY	: USSR	R
CATEGORY	: Diseases of Farm Animals. Diseases Caused by Helminths	
ABD. JOUR.	: ZhVetMed., No. 6 1959, No. 20039	
AUTHOR	: Rutkus, J.	
INST.	: Lithuanian Veterinary Academy	
TITLE	: On the Problem of Anthelmintic Properties of Oxygen	
ORIG. PUB.	: Liet. vet. akad. darbai, Tr. Lit. vet. akad., 1957, 3, 261-266	
ABSTRACT	: Silvery-black foxes (164 heads) affected with toxocarosis were treated with oxygen which was introduced from an "oxygen pillow" under a pressure of 10-15 mm of mercury. It was shown that a single and threefold infusion of O ₂ without the administration of a laxative was ineffective. With a single infusion of O ₂ and simultaneous administration of a laxative, an extensity of effectiveness of 15% was obtained. With threefold infusion of O ₂ for 3 days, and administra-	
CARD:	1/2	

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(EEAI 9:3)

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(MIRA 17:12)

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(Pigments) (Cadmium sulfite)

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sibiricus. Trudy Biol. inst. Sib. otd. AN SSSR no. 10:57-62
'63. (MIRA 17:5)

SAVCHENKO, A.M., nauchnyy sotrudnik; BUTKUTE, A.P., nauchnyy sotrudnik

Preserving young growth during the working of cuttings with
skidding of lumber by tractors in fir-spruce forests of
Krasnoyarsk Territory. Trudy VSNIP Ilesdov no.11:1-34 '64.
(MIRA 18:11)

SIVCHENKO, A.M., nauchnyy sotrudnik; BUTKUTE, A.P., nauchnyy sotrudnik;
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herbaceous-type forests in Krasnoyarsk Territory. Trudy
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Reaction of chlorites with hypochlorites. Part 2: Reaction of NaClO_2 with NaClO in the presence of hydroxide catalysts. Ibid.: 95-107

(MIRA 18:3)

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ROZOVSKY, G.I.; BUTKYAVICHYUS, Yu.P. [Butkevicius, J.]; PROKOPCHIK, A.Yu.

Colorimetric determination of trivalent copper. Trudy AN Lit. SSR.
Ser. B no.3:25-29 '64. (MIRA 18:5)

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PROKOPCHIK, A.Yu.; BUTKYAVICHYUS, Yu.P. [Butkevicius, J.]

Decomposition of hypochlorite in the presence of copper in a
homogeneous medium. Trudy AN Lit. SSR. Ser. B no.3:31-40 '64.
(MIRA 18:5)

1. Institut khimii i khimicheskoy tekhnologii AN Litovskoy SSR.

USSR/Farm Animals. General Problems

Q-1

Abs Jour : Ref Zhur - Biol., No 19, 1958, No 87994

Author : Butlakov N.M.

Inst

Title : Animal Husbandry in England

Orig Pub : Vestn. s.-kh. nauki, 1958, No 2, 119-126

Abstract : No abstract

Card : 1/1

L 2816-66 EWT(1)/EWT(m)/EPF(c)/EWP(j) IJP(c) RM

ACCESSION NR: AP5016183

UR/0051/65/018/006/1079/1081
535.373

AUTHORS: Butlar, V. A.; Grebenshchikov, D. M.; Solodunov, V. V.

TITLE: Some features of the kinetics of phosphorescence decay of triphenylene

SOURCE: Optika i spektroskopiya, v. 18, no. 6, 1965, 1079-1081

TOPIC TAGS: phosphorescence, electron spectrum, line spectrum, molecular spectrum, absorption spectrum

ABSTRACT: The authors investigated the kinetic of quenching of individual quasi lines of the phosphorescence spectrum of triphenylene, obtained by the method of E. V. Shpol'skiy et al. (Usp. Fiz. Nauk v. 80, 255, 1963 and earlier papers). To obtain the quasi-line spectrum, a solution of triphenylene in n-heptane was frozen in quartz by liquid nitrogen and illuminated at a wavelength near 313 nm. The individual lines were separated with a spectrograph (ISB-51) with photoelectric attachment (FEP-1). The decay curve was recorded with

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ACCESSION NR: AP5016183

an oscilloscope. The dependence of the logarithm of the relative intensity on the time was determined from the oscillograms. The phosphorescence-decay curve differs from exponential, and the reason for it is seen in the influence of triplet-triplet absorption, the maximum of which lies in the spectral region where the deviation was observed. The results of the tests show also that all the investigated quasi lines belong to the triphenylene molecule and correspond to transitions from the same triplet level to different vibrational sublevels of the ground state. The partial overlap of the phosphorescence spectrum with the triplet-triplet absorption spectrum is apparently the cause of the retardation of the phosphorescence process during its initial stages. The presence of an intense background may greatly distort the oscillograms showing the phosphorescence decay in the initial stages. The results demonstrate once more that the Shpol'skiy effect makes it possible to increase the information obtainable from luminescence spectra. Orig. art. has: 2 figures

ASSOCIATION: None

Card 2/3

L 2816-66

ACCESSION NR: AP5016183

SUBMITTED: 12Dec64

ENCL: 00

SUB CODE: OP

NR REF SOV: 003

OTHER: 001

PC
Card 3/3

L-04819-67 EWP(j)/EWT(m) RM

ACC NR: AP6026981

SOURCE CODE: UR/0051/66/021/002/0250/0252

AUTHOR: Grebenshchikov, D. M.; Butlar, V. A.; Solodunov, V. V.

ORG: none

TITLE: Phosphorescence of two types of radiating centers of coronene in paraffin solutions

SOURCE: Optika i spektroskopiya, v. 21, no. 2, 1966, 250-252

TOPIC TAGS: phosphorescence, coronene, excited state, luminescence center, HEPTANE

ABSTRACT: The phosphorescence decay of coronene in n-heptane was studied at 77°K on individual quasi-lines (5614 and 5631 Å) in order to determine the lifetime of each radiating center separately. It was found that when the sample is excited with light from a DKSSh-100 xenon lamp through a 313 nm filter, the decay is nonexponential, indicating that the deviation from exponentiality is due to reabsorption of the radiation by triplet molecules. The effect of reabsorption on the phosphorescence decay of coronene is practically constant over the entire spectral range studied (5150-5700 Å). It is shown that two different types of radiating centers formed by coronene molecules in n-heptane at 77°K, whose pure electron transitions are separated by 52 cm⁻¹, have different lifetimes of the excited state which differ by 0.3±0.05 sec. The different lifetimes of the excited states of radiating centers separated in space confirm that the conditions surrounding these molecules affect the electronic

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UDC: 535.373

L 04819-67

ACC NR: AP6026981

states of the molecules. In the phosphorescence spectrum of coronene in n-octane, the different distances between the doublet components indicates changes in the vibrational frequencies of the molecule on passing from one radiating center to another. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 01Feb66/ ORIG REF: 010/ OTH REF: 001

Card

2/2 *gd*

CHWISTECKA, Wiktoria; LALKO, Janina; BUTLER, Anna

Preservation of the reserve tissue material for investigations with poliomyelitis virus. Bull. Inst. Marine Trop. M. Gdansk 7:62-66; Russian transl. p. 67-70; English transl. p. 70-73 1956.

1. Z Panst. Inst. Med. Mors. i Trop. w Gdansku.
(TISSUE CULTURE,
cultivation of polio. virus, preserv. of tissue
(Pol; Rus; English))
(POLIOMYELITIS VIRUS, culture,
tissue culture, preserv. of tissue (Pol; Rus; English))

BUTLER, S.A.

PHASE I

TREASURE ISLAND BIBLIOGRAPHICAL REPORT

AID 416 - I

BOOK

Call No. : AF627431

Author: BONCH-BRUYEVICH, M. D., Dr. of Techn. Sci., Ed.

Full Title: AERIAL PHOTOGRAPHY OF CITIES AND CITY SETTLEMENTS

Transliterated Title: Aerofotos"yemka gorodov i gorodskikh poselkov

Publishing Data

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Publishing House: Publishing House of the Ministry of Communal Economy of the RSFSR

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Editor: Bonch-Bruyevich, M. D.

Tech. Ed.: None

Editor-in-Chief: None

Appraiser: None

Others: Separate chapters were written by: Deyneko, V. F. (Introduction, Chapters II, III, VI, VII and X); Sarantsev, N. M. (Ch. I); Rudakov, A. Ye. (Ch. IV); Tolgskiy, V. S. and Butler, S. A. (Ch. V and IX); Yermeyev, V. S. (Ch. VIII); Sokolova, N. A., Recipient of the Stalin Prize (Ch. XI).

Text Data

Coverage: This is a handbook in which the processes of aerial surveying and photography are outlined, particularly their application in mapping cities and city settlements from aerial photography negatives. The main emphasis is on procedures in taking aerial photographs, processing the negatives and interpreting the positives. Equipment for making negatives (cameras, lenses and

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Aerofotos"yemka gorodov i gorodskikh poselkov

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mounts) as well as for processing negatives and mapping (rectifiers, copy cameras, multiplex) is outlined only very briefly without giving any detailed information. Many tables are of practical help for those who engage in picture taking and analytical processing of negatives. However, no new or special methods could be found in this manual. Tables, diagrams.

BUTLER, S.A., inzh.; VVEDENSKIY, I.I., inzh.

Technical means and methods used in aerial surveys.

Transp. stroi. 13 no.2:40-43 F '63.

(MIRA 16:3)

(Aerial photogrammetry)

GORINOV, Aleksandr Vasil'yevich, nauchnyy sotrudnik; BUTLER, Serafin Aleksandrovich, nauchnyy sotrudnik; MALYAVSKIY, Boris Kirillovich, nauchnyy sotrudnik; NORMAN, Edgar Arturovich, nauchnyy sotrudnik; TAVLINOV, Viktor Konstantinovich, kand. tekhn.nauk, nauchnyy sotrudnik; VASIL'YEV, Yu.F., red.izd-va; ASTAF'YEVA, G.A., tekhn.red.

[Air levelling in surveying railroad lines; explorations of mountainous areas] Aeronivelirovanie na izyskaniyakh putei soobshcheniya; materialy issledovaniy v gornoj mestnosti. Moskva, Izd-vo Akad.nauk SSSR, 1959. 272 p. (MIRA 13:3)

1. Chlen-korrespondent AN SSSR (for Gorinov). 2. Rukovoditel' laboratorii zheleznodorozhnykh izyskaniy Vsesoyuznogo nauchno-issledovatel'skogo instituta transportnogo stroitel'stva (TsNIIS) Mintransstroya SSSR (for Butler). 3. Laboratoriya zheleznodorozhnykh izyskaniy Vsesoyuznogo nauchno-issledovatel'skogo instituta transportnogo stroitel'stva (TsNIIS) Mintransstroya SSSR (for all except Vasil'yev, Astaf'yeva).

(Aerial photogrammetry)

(Railroads--Surveying)

BUTLER, S.A., kand.tekhn.nauk

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BUTLER, Z.

"How to mechanize the cutting of narrow tunnels in rocks and rooms in coal seams."
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SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress